COST ANALYSIS
Partial Excavation vs Full Depth Excavation
Vineland OU3 Phase IV
1-12-10

This estimate evaluates the cost savings associated with removing only the top 18" of contaminated peat in certain areas of the Phase IV Floodplain. Following are the excavation guidelines that would be followed using this approach:

-For areas within 50' of the original stream centerline where the arsenic concentration is > 20 ppm, , excavate all peat down to the top of sand elevation.

-For the areas outside of 50' from the original stream centerline where the arsenic concentration is >120 ppm, excavate all peat down to the top of sand elevation

-For areas outside of 50' of the original stream centerline where the peat is between 20 and 120 ppm, excavate only the top 18" of the floodplain, place 2 layers of coir mat, and backfill with 12" of clean sand and 6" of clean manufactured topsoil.

Contaminated Peat Quantities:

Using SES's sample map, the total Phase IV contaminated area is 21.2 acres. The area of Phase IV that could be considered for partial excavation is approximately 9.6 acres. The remaining 11.6 acres will require full excavation to the top of sand elevation because it meets one of the following criteria:

a. The peat contains >120 ppm As
b. The area is within 50' of the original stream centerline
c. The area is within the Maurice River diversion footprint

Full Excavation Area: Assuming an average of 4' excavation depth for the above areas, the quantity requiring full excavation is given by 11.6 acres x 43,560 sf/acre x 4' thick / (27 cf/cy) = 75,000 tons. This area will not be considered in this cost estimate.

Partial Excavation Area: The quantity of contaminated peat in the area being considered for partial excavation is given by 9.6 acres x 43,560 sf/acre x 4' thick / (27 cf/cy) = 62,000 tons.

Considering the partial excavation (9.6 acre) area only, the amount of contaminated peat to be excavated if only the top 18" is removed is:

9.6 acre x 43,560 x 1.5 = 23,200 tons.

ESTIMATED COST FOR PARTIAL EXCAVATION OF THE 9.6 ACRE AREA:

Following is the crew size for the partial excavation area, as determined during the excavation/backfill test area work:

-2 laborers – unroll and place mat
-1 laborer – standby and guide trucks
-1 laborer – foreman
-1 laborer (50% of time) – miscellaneous support
-1 operator – place mat and excavate contaminated soil
-1 operator – move excavation soils to stockpile
-1 operator – dozer/fill
-1 operator (15% of time) – loader – bring in soil and fill
-1 teamster (50% of time) – deliver fill

Totals:
4.5 laborers
3.15 operators
0.50 teamsters

Calculate the excavation rate during construction of the test area:

Test Area is 120' x 85' x 2.5' deep / 27 = 944 tons

Duration of test area work was 15 days

Rate of excavation of contaminated soil was 944 tons/ 15 days = 63 tons per day – this includes the time necessary to excavate the contaminated peat, place the mat and then place the temporary sand work platform. Note, there are some inefficiencies in this rate due to removal and reconstruction of some areas which failed where the coir mat overlap was reduced.

SES's WVN cost proposal assumed an excavation rate of approximately 120 tons per day.

For this estimate, will use a rate of 100 tons per day. This is significantly higher than the rate observed during the test area work but since the work is expected to get more efficient as it progresses, this is considered a reasonable rate.

Duration of partial excav area work: 23,200 tons/(100 tons/day) = 232 work days

PEAT EXCAVATION

Cost Estimate Phase IV
Partial Excavation

Phase IV Partial Excavation - Daily Labor Cost

Labor

Craft	Hours	Labor Rate - Direct	Labor Rate - Fringe	Total Labor
Operators Directs	31.5	$ 49.52		$1,559.88
Op Fringe	31.5		$21.08	$664.02
Operator Steward	0	$ 50.52		$0.00
Op Stew Fringe	0		$21.08	$0.00
Laborers Directs	45	$ 32.85		$1,478.25
Lab Fringe	45		$ 20.25	$911.25
Laborer Steward	0	$ 33.85		$0.00
Lab Stew Fringe	0		$ 20.25	$0.00
Laborer Foreman	10	$ 33.85		$338.50
Laborer FM Fringe	10		$ 20.25	$202.50
Teamster Directs	5	$ 28.70		$143.50
Tmstr Fringe	5		$ 16.49	$82.45
Tmstr Steward	0	$ 29.70		$0.00
Tmstr Stew Fringe	0		$ 16.49	$0.00
			Sum Directs	$3,520.13
			Burden 30.12%	$1,060.26
			Subtotal	$4,580.39
			Fringes	$1,860.22
			Subtotal	$6,440.61

Cost Estimate Phase IV
Partial Excavation

Overhead 27.04%	$1,741.54
Subtotal	$8,182.15
G&A 2.4%	$196.37
Subtotal	$8,378.53
Subtotal Labor	**$8,378.53**
Overtime 5%	**$418.93**
TOTAL LABOR	**$8,797.45**

Work Crew:
2 laborers unroll mat
1 laborer guide trucks
1 laborer foreman
0.5 laborer - misc. support
1 operator - place mat/excavate
1 op - move excav peat to pile
1 op - dozer/fill
.15 op - loader, bring in mats and fill
.5 teamsters - deliver fill

LABOR:

From the "Partial Excavation Daily Labor Cost" spreadsheet, the labor cost per day for the work crew is $8,797.45 per day. Following is the estimated labor cost for the entire area:

232 days x $8,797.45 per day = $2,040,000

EQUIPMENT:

Dozer 232 days x 10 hrs/day x $27.85/hr =	$ 64,612
Moxy 232 days x 5 hrs/day x $34.46/hr =	$ 39,974
PC300 232 days x 10 hrs/day x $71.26/hr =	$165,323
Swamp Excavator 232 days x 10 hrs/day x $175/hr =	$406,000
Loader 232 days x 10 hrs/day x $50/hr =	$116,000
	$791,909

MATERIALS:

Fuel/Oil/Grease

Dozer	2,320 hrs x 3 gall/hr x $3/gall=	$20,880
Moxy	1,160 hrs x 5 gall/hr x $3/gall =	$17,400
PC300	2,320 hrs x 6 gall/hr x $3/gall =	$41,760
Loader	2,320 hrs x 7.5 gall/hr x $3/gall =	$52,200
Swamp Excav	2,320 hrs x 6 gall/hr x $3/gall =	$41,760
		$174,000

Coir Mat:

408,576 sf (partial excav area) * 13/8 * 2 layers = 1,327,872 sf of mat (accounts for 5' overlap for each roll)

1,327,872 sf * $0.312/sf = $415,000

Sand Fill:

408,576 sf x 1 ft thick / 27 * 1.5 tons/cy * $6.50/ton = $147,541

SAND EXCAVATION

Estimated cost to excavate and remove the top 2' of the 3' thick temporary sand platform layer (note, topsoiling labor is not considered here because the cost for topsoiling is the same regardless of whether the partial excavation or full excavation procedure is followed)

Total quantity of sand to be excavated:

408,576 sf x 2' / 27 = 30,300 cy

Per Means, use 800 cy/day for a 1 cy/excavator
30,300 cy/(800 cy/day) = 38 days

LABOR:

Assume an excavation crew of 1 operator, 1 teamster (hauling away fill), and ½ laborer – see spreadsheet – est cost is $2,333/day for labor

EQUIPMENT:

Excavator:	380 hrs x $71.26/hr =	$27,078
Moxy:	380 hrs x $34.46/hr =	$13,095
		$40,173

MATERIALS:

Fuel/Oil/Grease

Excavator:	380 hrs x 6 gall/hr x $3/gall =	$ 6,840
Moxy:	380 hrs x 5 gall/hr x $3/gall =	$ 5,700
		$12,540

TRANSPORTATION AND DISPOSAL

23,200 tons x $80/ton =	$1,856,000
ESTIMATED COST FOR PARTIAL EXCAV	$5,477,163

ESTIMATED COST FOR FULL EXCAVATION OF THE 9.6 ACRE AREA:

LABOR/EQUIPMENT(Combined, per SES cost rpt) are $50.36/ton (actual Phase II costs per cost report – does NOT include cost of fill – need to revise to account for fill)

62,000 tons x $50.36/ton =	$3,122,320
MATERIALS:	
Sand Fill 3.5 ft thick x 408,576 sf x $6.50/ton / (27 cf/cy) =	$ 344,263
Transportation and Disposal:	
62,000 tons x $80/ton =	$4,960,000
ESTIMATED FOR FULL EXCAV	$8,426,583
POSSIBLE COST SAVINGS: **$8,426,583 - $5,477,163 =**	**$2,949,420**

Costing Scenarios for HQ Briefing

Table –
Phase Remaining

Activity	Phase	Estimated Cost	Funding Source
mill to Rte SJ	Phase 2		
Rte SJ to MRP	Phase 3	X / Y	Stim / Plan
MRP to Confluence area	Phase 4a		Stim
	Phase 4b		
Confluence area	or 5		

Now
phase 4 prelim
phase 4 full-scale
Phase 2 restoration will be only money left

• ~~Letter~~ memo
Coe letterhead
operation completion
for contam. mat.
excavation
and processing
for OU1 completed
Dec. 21, 2007
While this marks
the removal of
contaminated
source material
from the
plant site
restoration activities
remain to be
completed for the
OU 1 area once
the operation of
? the soil washing
plant is complete.

Cost Estimate Phase IV
Partial Excavation

Phase IV Partial Excavation - Remove Temp Work Platform - Daily Labor Cost

Labor

Craft	Hours	Labor Rate - Direct	Labor Rate - Fringe	Total Labor
Operators Directs	10	$ 49.52		$495.20
Op Fringe	10		$21.08	$210.80
Operator Steward	0	$ 50.52		$0.00
Op Stew Fringe	0		$21.08	$0.00
Laborers Directs	5	$ 32.85		$164.25
Lab Fringe	5		$ 20.25	$101.25
Laborer Steward	0	$ 33.85		$0.00
Lab Stew Fringe	0		$ 20.25	$0.00
Laborer Foreman	0	$ 33.85		$0.00
Laborer FM Fringe	0		$ 20.25	$0.00
Teamster Directs	10	$ 28.70		$287.00
Tmstr Fringe	10		$ 16.49	$164.90
Tmstr Steward	0	$ 29.70		$0.00
Tmstr Stew Fringe	0		$ 16.49	$0.00
			Sum Directs	$946.45
			Burden 30.12%	$285.07
			Subtotal	$1,231.52
			Fringes	$476.95
			Subtotal	$1,708.47